REMARKS

The Office Action acknowledged that on August 22, 2002, a provisional election was made with traverse to prosecute the invention of Group I, consisting of Claim 1. Claim 1 is maintained in the application. The applicants elect Claim 1 with traverse. The search for the non-elected invention necessarily entails the search for the elected invention, which places no additional burden on the Examiner. The Applicants have added new Claims 3-8, of which Claim 4 is independent.

The Office Action required a new title. The Applicants have amended the title.

The Office Action rejected Claim 1 under 35 U.S.C. § 112, second paragraph. Specifically, the Office Action provided that the phrase "SiC-formed material" is vague and indefinite. The Applicants amend Claim 1 by replacing "SiC-formed" with "silicon carbide," the full chemical name for SiC.

The Office Action rejected Claim 1 under 35 U.S.C. § 103(a) as being unpatentable over Fujii *et al.* (U.S. 5 313 078) or Robbins *et al.* (U.S. 5 801 073) alone, or when taken in combination. The Office Action acknowledges that both references fail to teach the three properties of original Claim 1.

The presently claimed invention is directed to material formed from silicon carbide (SiC) by using chemical vapor deposition (CVD). The CVD of the present invention employs nitrogen gas and raw material gas to produce a SiC material with a specific gravity of 3.15 or more, light transmittance of 1.1 to 0.05%, and resistivity of 3×10^{-3} to 10^{-5} Ωm. Further, the criticality of the three property ranges is of record in the present application. The specification, at page 7, line 26, states, "No SiC film meeting the various characteristics of the present invention can be obtained if the above reaction conditions are not satisfied." For example, as recited on page 8 of the specification, when the retardation time is less than 7 seconds, the specific gravity,

and thus the closeness of the SiC decreases. This results in the SiC absorbing impurity gasses, which reduces oxidation and corrosion resistance. If the retardation time exceeds 110 seconds, the deposition rate is retarded. Additionally, if the nitrogen gas concentration is less than 10 vol%, the material has both a high resistivity and high light transmittance, resulting in a light permeable film and if the nitrogen gas concentration is more than 120 vol%, pores can form in the SiC, resulting in an uneven surface.

It is therefore respectfully submitted that the prior art cited in the Office Action does not disclose the presently claimed invention.

The Fujii *et al.* reference discloses in the "Prior Art" section, that blue light emitting diodes using SiC can be manufactured with "...favorable light transmittance," that blue light emitting diodes need "...to be low in resistance," and that the substrate "...exhibits a resistivity of 1 Ω-cm or less...." This reference merely discloses that SiC, as does several materials, has the properties of light transmittance and resistivity. There is no disclosure of a material formed from SiC having properties of claimed invention, specifically, a specific gravity of 3.15 or more, light transmittance of 1.1 to 0.05%, and resistivity of 3×10^{-3} to 10^{-5} Ωm. Further, there is no teaching or suggesting that any of the above three ranges are beneficial or desired. The reference also fails to teach or suggest any process by which the three above specific ranges can be attained in a material formed from SiC.

The Robbins *et al.* reference discloses that polycrystalline SiC, at certain purities and stoichiometries, has a "...resistivity of greater than 4×10^{13} Ω-cm," and that a **nitrided** material made by the disclosed process has "...low specific gravity" (emphasis added). This reference, like Fujii *et al.* fails to disclose a material formed from SiC having the properties of the claimed invention. This reference also does not teach or suggest that any of the above three ranges are beneficial or desired. Robbins likewise does

not teach or suggest any process by which the above three specific ranges can be attained in a material formed from SiC. Regarding resistivity, the Robbins *et al.* reference discloses, at column 12, line 37, a silicon carbide capacitor with a resistivity of 4 x 10^{13} Ω-cm (4 x 10^{11} Ωm)or higher; at column 8, line 26, a titanium carbide conductor with a resistivity of 10^{-6} Ωm; and at column 43, line 33, a silicon carbide transistor having a resistivity of 0.05 Ω cm or lower, but there is no teaching or suggestion of applicants claimed properties. Accordingly, it is respectfully submitted that the presently claimed invention is clearly patentably distinct over both Fujii *et al.* and Robbins *et al.*, when taken alone, or in combination.

Moreover, in the specification, there are Examples and Comparative Examples that establish the patentability of the claimed invention. In tables 1 through 3 on pages 13 to 15 there are 10 examples of a SiC material prepared according to the present invention. Tables 4 through 6 show Comparative Examples that fall outside the scope of the present claims and falling within the scope of the disclosure of the references cited by the examiner. As referenced above, Robbins *et al.* at column 43, line 33 describes only a resistivity of 0.05 Ωcm ($5x10^{-4}$ Ωm) or lower. Yet there is no disclosure of the claimed specific gravity, light transmittance, nitrogen gas concentration volume percent, or raw material gas concentration volume percent. Similarly, Fujii *et al.* at column 13, line 24 discloses a resistivity of 0.01 to 1 Ωcm ($1x10^{-4}$ to $1x10^{-2}$ Ωm), but fails to disclose the claimed specific gravity, light transmittance, nitrogen gas concentration volume percent, and raw material gas concentration volume percent.

Fujii *et al.* discloses in the first embodiment, a nitrogen gas concentration of 150 to 500 vol%, and a raw material gas concentration of 0.02 vol%. However the applicants new Claim 4 recites a nitrogen gas concentration of 10-120 vol%, and a raw material gas concentration of 5-15

vol%. Again, referencing the Examples (Tables 1-3) and the Comparative Examples (Tables 4-6), the SiC of the present invention had good external appearance, no cracks, and all of the claimed properties. This is clearly unexpected in light of the references cited by the examiner, and establishes the patentability of the presently claimed invention.

In addition, MPEP 706.02(j) provides that, to establish a *prima facie* case of obviousness, three criteria **must** be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the prior art reference (or references when combined) **must teach or suggest** all of the claim limitations (emphasis added). The teaching or suggestion **must be found in the prior art**, and not based on Applicants' disclosure (emphasis added).

Thus, even if one skilled in the art would find it obvious to modify the reference or to combine reference teachings, as stated in the Office Action at page 4, it is still required that the prior art must teach or suggest all of the claim limitations. Here, because there is no teaching or suggesting of all of the claim limitations, there is no *prima facie* case of obviousness. For example, no reference teaches or suggests the claimed ranges, *i.e.* specific gravity of 3.15 or more, light transmittance of 1.1 to 0.05%, and resistivity of 3×10^{-3} to 10^{-5} Ωm. Therefore, Claim 1 is patentably distinct and allowable.

New Claim 3 is dependent from Claim 1. Claim 3 provides for the specific limitation of the SiC material having n-type semiconductor characteristics. New independent claim 4 is similar to Claim 1, but has further claim limitations for ranges of the raw material and nitrogen gas concentration volume percent. New Claims 5-8 depend from Claim 4. Claim 5 and has the further claim limitation of the carrier gas being either hydrogen gas or argon gas. Claim 6 has the further

claim limitation of the carrier gas being a combination of hydrogen gas and argon gas. Claim 7 has the further limitation of a means for controlling the substrate between 1100°C and 1500°C. Claim 8 has the further claim limitation of the raw material gas having a retardation time between 7 and 110 seconds. All of the new claims are patentably distinct over the references cited in the Office Action, and thus allowable.

The Examiner is respectfully requested to reconsider the present application and to pass it to issue.

Respectfully submitted,

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